

REMARKS

The above amendment to Claim 1 serves to incorporate the subject matter of Claim 7 into Claim 1. By this amendment, Claim 1 is now limited to a process of the presently required steps and forms a cellular composite which consists of the three specifically identified components (i.e. a polyisocyanate, water and inorganic hollow microspheres), in which the amount of water present is such that there is an excess of 2 to 5 times the stoichiometric quantity required by on the NCO group content of the polyisocyanate component. Claim 7 has been amended to narrow the range of excess water required in the process. Support for the amendment to Claim 7 can be found in the specification on page 6, lines 2-4. In addition, Claim 10 has been cancelled. Support for new Claim 11 can be found in the specification on page 6, lines 10-13.

Rejection of Claim 9 over the Spangler et al reference under
35 U.S.C. § 102(b), or in the alternative under 35 U.S.C. § 103(a)

Claim 9 was rejected under 35 U.S.C. § 102(b) as being anticipated by, or in the alternative under 35 U.S.C. § 103(a) as being obvious over, the Spangler et al reference (U.S. Patent 6,166,109).

Applicants respectfully submit that the rejection of Claim 9 is moot in view of the preceding amendment to Claim 1. It is respectfully requested that this rejection be withdrawn as it is clearly improper.

With regard to rejection of Claim 9 under 35 U.S.C. § 103(a) as being obvious over the Spangler et al reference, Applicants respectfully submit that the presently claimed cellular composite is not obvious to one of ordinary skill in the art from this reference.

The Spangler et al reference discloses hybrid bimodal syntactic rigid polyurethane and/or polyisocyanurate products having improved compressive strengths at a given density as compared to typical foams at that density. See column 2, lines 7-19.) These comprise a) from 20 to 80 wt. % of hollow microspheres and b) from 80 to 20 wt. % of a closed cell polyurethane foam. The

cells of the foam have average diameters of from 0.01 to 60 microns and the ratio of the average diameter of the microspheres to the average diameter of the cells is at least 2:1. See column 2, lines 17-34. In addition, the terms "hybrid", "syntactic", "bimodal cell size", and "PUR/PIR foam" are defined at column 1, lines 31-42.

The present amendment to Claim 1 requires that the mixture prepared in step (A) of the claimed process consist of a polyisocyanate and water, with water being present in an amount such that there is an excess of from 2 to 5 times the stoichiometric quantity required based on the NCO group content of the polyisocyanate. The inorganic hollow microspheres are added to this mixture under low shear mixing, and a mold is filled with this mixture of polyisocyanate, water and inorganic hollow microspheres. Heating of the mold reacts the polyisocyanate with the water to form a polyurea which binds the inorganic hollow microspheres and forms the desired cellular composite. It is readily apparent that this stoichiometric excess of water required by the process claims affects the composition and the properties of the cellular composite of Claim 9.

Applicants respectfully submit that one of ordinary skill in the art would readily recognize and understand upon reading the Spangler et al reference that this reference is directed to polyurethane foams and to polyisocyanurate foams. By comparison, the present invention is directed to cellular composites formed by polyureas binding the hollow microspheres. The skilled artisan knows and understands the difference between a polyurethane and/or polyisocyanurate as required by the Spangler et al reference and a polyurea as required by the presently claimed invention.

Although the Spangler et al reference discloses water as a suitable reactant, one of ordinary skill in the art would realize that polyureas are formed by the reaction of water and isocyanates, and that such polyureas are outside the scope of the described and claimed polyurethanes and/or polyisocyanurates. The Examiner stated that the "additional elements recited by Spangler et al's disclosure" at column 4, line 40 through column 5, line 56, indicates that these elements are "optional embodiments by the language which sets them forth". (See page 8 of the final Office Action, 3rd full paragraph under the section titled "Claim Rejections – 35 USC §

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102".) Applicants respectfully submit that this is simply the Examiner's opinion and it is incorrect as it is clearly **contrary** to how one of ordinary skill in the art would interpret the Spitzer et al reference as a whole.

It is readily apparent to the skilled artisan that this reference requires polyurethane foams and/or polyisocyanurate foams. Polyureas are not disclosed therein! It is also apparent to the skilled artisan that any water present in the Spitzer et al reference is in small quantities. For example, water may be used as the blowing agent (see column 4, line 66 through column 5, line 34). From the working examples as set forth in TABLE 1 (at column 8), it is apparent that water is used in small quantities, regardless of whether it is used alone or in combination with another blowing agent. It is evident that the Spitzer et al reference does not suggest or even hint at the addition of water in amounts equal to the stoichiometric quantity required by the NCO group content of the polyisocyanate, much less in an excess of 2 to 5 times the stoichiometric quantity required!

In addition, the compressive strengths of the cellular composites of the present invention are considerably higher than those of the hybrid bimodal syntactic rigid polyurethane and/or polyisocyanurate products of this reference. As set forth in TABLE 1 (at column 8) of the Spitzer et al reference, the compressive strength of the products produced in accordance with the invention therein vary from 21 psi (Example 4) to 86 psi (Example 2). By comparison, the cellular composites of the present invention have compressive strengths between 398 psi (Example 6 in Table 2) and 2589 psi (Example 4 in Table 1). Thus, the lowest compressive strength of any examples in the present application invention is 463% higher than the highest compressive strength in the Spitzer et al reference!

Applicants respectfully submit that the Spitzer et al reference simply does not suggest the presently claimed invention to one of ordinary skill in the art. Sufficient information is not disclosed by this reference which would lead the skilled artisan to reasonably conclude that compressive strengths could be increased by over 400% by "substituting" a polyurea for the polyurethane and/or polyisocyanurate required by the Spitzer et al reference.

Only on hindsight does it become obvious to modify the Spitzer et al reference in the manner necessary to "arrive at" the present invention. Such a perspective does not, however, provide a proper basis for a rejection of the claims under 35 U.S.C. § 103(a).

It is therefore submitted that this rejection is improper and requested that it be withdrawn.

Rejection of Claims 1 and 4-10 over the Spitzer et al reference alone, or in combination with the Schubert et al reference, under 35 U.S.C. § 103(a)

Claims 1 and 4-10 were rejected under 35 U.S.C. § 103(a) as being unpatentable of the Spitzer et al reference (U.S. 6,166,109) alone, or in view of the Schubert et al reference (U.S. 4,724,250).

The Schubert et al reference is directed to a one-component molding material and its use as a construction material. This molding material comprises (A) 40 to 80% by wt. of the isocyanurate of 1,6-hexamethylene diisocyanate with an NCO content of 18 to 24% by wt., (B) 0 to 20% by wt. of crude MDI and/or prepolymer of polyol and crude MDI and/or isophorone diisocyanate (IPDI) which is optionally in combination with dimerized triazine of TDI (toluene diisocyanate), copolymerized triazine of TDI and HDI and/or naphthalene diisocyanate (NDI), (C) 5 to 20% by wt. of a mixture of (a) 50 to 100% by wt. of secondary ammonium phosphate, (b) 0 to 20% by wt. of primary ammonium phosphate, (c) 0 to 20% by wt. of zeolite and/or crystalline alkali silicate, (d) 0 to 20% by wt. of $\text{Ca}_3(\text{PO}_4)_2$, (f) 0 to 20% by wt. of azodicarbonamide, (g) 0 to 20% by wt. of calcined calcium oxide, (D) 0 to 50% by wt. of filler, and (E) 0 to 5% by wt. of promoter. It further specifies that the amount of the secondary ammonium phosphate must be 80 to 100% by wt. of (C) if component (C) is only present in an amount of 5 to 10% by wt.

The rejection of Claim 10 is moot as this claim has been cancelled.

Applicants respectfully submit that the presently claimed invention is not rendered obvious by the Spitzer et al reference (U.S. 6,166,109) alone, or in combination with the Schubert et al reference (U.S. 4,724,250).

For the reasons as discussed above with respect to the rejection of Claim 9 over the Spangler et al reference, Applicants respectfully submit that the Spangler et al reference (when considered alone) does not render the presently claimed invention obvious. It is readily apparent that all independent claims of the present application require polyureas and that water to be used in an amount such that there is a stoichiometric excess of 2 to 5 times that required based on the NCO group content of the polyisocyanate. As Applicants previously stated, the Spangler et al reference is directed to polyurethane foams and/or polyisocyanurate foams. This reference simply does not disclose or suggest that any significant quantity of water be used therein. Nor would one of ordinary skill in the art have any reason to expect that "substituting" polyureas for the polyurethane foams and/or polyisocyanurate foams of the Spangler et al reference would result in significantly higher compressive strengths as discussed hereinabove. It is respectfully submitted that the Spangler et al reference when considered alone does not render the presently claimed invention obvious under 35 U.S.C. 103(a):

Applicants submit that the rejection based on the Spangler et al reference alone is improper and request that it be withdrawn.

Furthermore, Applicants respectfully submit that combining the Spangler et al reference with the Schubert et al reference does not render the presently claimed invention obvious under 35 U.S.C. 103(a). It appears from the Examiner's comments that this reference is relied on to establish that employing heating during a curing process speeds the reactive effects.

Applicants respectfully submit that the disclosure at column 9, lines 1-20 of the Schubert et al reference is not directed to heating to facilitate the curing reaction of isocyanate and water as so stated by the Examiner in the final Office Action on page 7, 2nd paragraph, lines 2-4 therein. Rather, this describes curing of the molding material. The molding material as defined by the Schubert et al reference comprises (A) 40 to 80% by wt. of the isocyanurate of 1,6-hexamethylene diisocyanate with an NCO content of 18 to 24% by wt., (B) 0 to 20% by wt. of crude MDI and/or prepolymer of polyol and crude MDI and/or isophorone diisocyanate (IPDI) which is optionally in combination with dimerized triazine of TDI (toluene diisocyanate),

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copolymerized triazine of TDI and HDI and/or naphthalene diisocyanate (NDI), (C) 5 to 20% by wt. of a mixture of (a) 50 to 100% by wt. of secondary ammonium phosphate, (b) 0 to 20% by wt. of primary ammonium phosphate, (c) 0 to 20% by wt. of zeolite and/or crystalline alkali silicate, (d) 0 to 20% by wt. of $\text{Ca}_3(\text{PO}_4)_2$, (f) 0 to 20% by wt. of azodicarbonamide, (g) 0 to 20% by wt. of calcined calcium oxide, (D) 0 to 50% by wt. of filler, and (E) 0 to 5% by wt. of promoter. Thus, it is respectfully submitted that the Examiner has not fairly characterized this portion of the specification and what it discloses to one of ordinary skill in the art.

It is evident that the presently claimed invention clearly requires an excess of water in combination with the polyisocyanate component, wherein the amount of water is from 2 to 5 times the stoichiometric quantity required based on the NCO group content of the polyisocyanate component. Applicants respectfully submit that the Schubert et al reference, like the Spitzer et al reference, fails to disclose or suggest that an excess of water be used and a polyurea be formed. Accordingly, combining the Schubert et al reference with the Spitzer et al reference does not properly suggest the presently claimed invention to one of ordinary skill in the art.

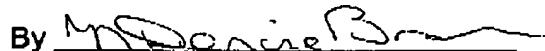
This combination of references does not fairly suggest the present invention to the skilled artisan. It is respectfully submitted that this rejection is improper and Applicants request that it be withdrawn.

Rejection of Claim 10 over the Cioca et al reference in view
of the Markusch et al reference under 35 U.S.C. 103(a)

Applicants respectfully submit that this rejection is moot in view of the fact that Claim 10 has been canceled.

In view of the above amendments and remarks, Applicants respectfully submit that the presently claimed invention is not properly rejected under 35 U.S.C. § 102(b) and/or under 35 U.S.C. § 103(a) as being obvious over any of the presently relied upon references. It is respectfully requested that these rejection be withdrawn and Claims 1, 4-9 and 11 be allowed.

Respectfully submitted,

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